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REPORT ON INSECT CONDITIONS

HAPPY CAMP-LAVA BED AREA, MODOC NATIONAL FOREST

SEASON OF 1931

TENTH ANNUAL REPORT

by

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Summary

1. The 1931 bark beetle infestation in the Happy Camp-Lava Bed Area of the Modoc National Forest was found to be similar in many respects to the 1925 infestation that began the epidemic of 1925-28.

2. The data upon which the estimates presented in this paper are based were gathered in conjunction with the regional survey in June and July and by a special survey of the Badger and White Horse Units in September.

3. The 1931 infestation showed a complete reversal of the conditions that existed in 1930, and distinct epidemic tendencies were observed for 1931. Nearly twice as much timber was infested as in 1930.

4. Increases in losses caused by bark beetles were evident in all units of the area, although the infestation in the Pit River, Happy Camp and Lava Bed Units remained endemic as far as quantity of timber infested was concerned.

5. The infestation within the fringe type of the Glass Mountain Unit remained heavy and epidemic. As over 65% of the total stand apparently has been killed by insects over a period of eleven years, the stand is now largely a forest of snags. No control was recommended for this area, due to the low quality of the timber and its lack of value.

6. Sudden and disturbing increases and exhibition of epidemic tendencies and conditions were observed in portions of the Badger and White Horse Units. Control was recommended for approximately 39,000 acres of timbered lands in the former unit, and for about 7,000 timbered acres of government land within the national forest boundary in the latter unit.

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Introduction

This paper reports the results of the tenth survey of the Happy Camp-Lava Bed area in the Modoc National Forest. Preceding cruises of this area have been described in a series of unpublished reports by Keen, Patterson and Person.

The history of the infestation in this area is well known to those who have an interest in the timber involved or in the entomological phases of the problem. Figure 3 graphically shows the history of the infestation from the time of the first survey to the present. It is extremely interesting to note that the conditions of infestation in 1931 are noticeably similar to those which occurred in 1925; not only in the amount of timber killed and in the fact that a sudden and marked increase in losses occurred in the two years, but also in that Patterson's map[1] showing the intensity of infestation in 1925 might, as far as the centers of heavier infestation are concerned, serve to indicate the intensity of infestation in 1931. The three centers of heavier infestation shown by him are approximately the three that were found this past season.

Methods

Two periods of work were involved in gathering the survey material. A regional survey crew worked in the area from June 1 to July 15, setting up and analyzing plots of the regional survey system. Surveys of the infestation in this region were made at this time in connection with the other work. Although pertinent data were secured, it was felt that, in view of the fact that control work would be justified in some areas if the seasonal tendencies revealed by this early work continued, only a fall cruise could furnish sufficiently accurate data upon which to recommend control. Accordingly in September a partial cruise of the area was made by Miller and Salman, in cooperation with representatives of the Forest Service, Pickering Lumber Company and McCloud Lumber Company. The Badger Unit (Pickering Sale Area) and portions of the White Horse Unit, in the vicinity of the McCloud Lumber Company's operations, were examined to determine if the infestation made control work desirable.

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[1]Patterson, J.E. Report of Western Pine Beetle Survey, Happy Camp-Lava Bed Area, Modoc National Forest, Calif., October, 1925. File Ms.

Ten half-section plots were cruised in this area in 1931, and a large amount of data was secured from road strips. Figure 4, which is a map of the Happy Camp-Lava Bed area, shows the location of the plots, as well as the boundaries of the units.

General Insect Conditions

Person[2] reported the infestation in the Happy Camp-Lava Bed area to be at a low ebb in 1930, although centers of heavier infestation (not, however, considered epidemic) existed in the fringe type of the Glass Mountain Unit and in the Timber Mountain Unit. Estimates of losses caused by the 1930 infestation showed a slight increase in the Badger Unit when compared with 1929 losses, while estimates for the remaining units indicated that the infestation had decreased since 1929.

Work done in the area early in the season of 1931 revealed marked and noticeable insect activity throughout the entire area. A later survey confirmed these observations and showed that abnormal insect activity was being continued by the winter brood over the entire area, and that the infestation in a large part of the Badger Unit and in portions of the White Horse Unit stood out as being particularly alarming. The distribution of the infestation is shown in Figure 4.

The causes of this sudden reversal of the trends of the 1930 infestation by the infestation of the 1931 season are not evident. The appearance of groups of summer-brood trees early in the season would indicate that preseasonal influences were associated with the initiation of the period of increased activity and losses. The length of the active season, however, which this year probably allowed the greater portion of the western pine beetle population to complete three full generations instead of the usual two, undoubtedly contributed to the heavy losses.

Composition of the Infestation

Person, in his 1930 report, remarked that an appreciable percentage (37.5%) of the loss in the area was caused by insects other than the western pine beetle. Analysis of the 1931-cruised losses shows that the western pine beetle has again assumed a position of greater importance, although losses caused by this insect do not constitute over 90% of the total, as was the case at the height of the epidemic in 1927 and 1928. Analysis of trees felled in the Badger Unit this winter showed flathead borers to be causing the greater portion of the injury due to secondary insects in that area. Survey data of the 1931 season showed that flathead borers, the mountain pine beetle and the large western pine engraver beetle--ranking in importance in the order named--caused practically all the loss attributable to secondary insects in the Happy Camp-Lava Bed Area.

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[2]Person, H.L. Report on Insect Conditions, Happy Camp-Lava Bed Area, Modoc National Forest; 9th Annual Report, October 1930. File Ms.

Insect Losses by Units

Table 1 summarizes plot data for 1930 and 1931, and estimates of the infestation in all units of the area are given in Table 2.

Glass Mountain Unit

Approximately half this unit--that portion of the area situated on the pumice and lava benches of the lower slopes of Glass Mountain--supported a moderate endemic infestation in 1931. Numerous windfalls, brought down in April 1931, are to be found in parts of the area, but these apparently played an unimportant part in the infestation. The stands of timber bordering the lava beds along the southern edge of this unit supported a somewhat more active type of infestation in 1931. Although it was evident that there had been a marked increase when compared with the infestation of 1930, it is not considered that the losses of 1931 in these stands were the result of more than a heavy endemic infestation. Groups of trees infested by individuals of the 1931 summer broods, however, were found to be rather common this season, and other epidemic tendencies were observed.

The fringe of timber in the north and northeast portions of the unit, which comprises about a quarter of the total area of the unit, suffered from a 1931 loss fully as heavy as that of 1930. Keen, in writing of the infestation in this area in 1926, stated that "during the past five years 25% of all trees over 6" d.b.h. and 35% of all trees over 24" d.b.h. have been killed by the beetles." In 1921 the total stand of timber on a half-section plot that has been cruised by the Bureau of Entomology since that time was considered to be 3,600,000 ft.b.m. A Forest Service cruise of 1930 estimated the stand on the same area as 1,148,000 ft.b.m. The Bureau of Entomology estimate for the same area, made in 1931, is somewhat lower, but agrees fairly well with this latter figure when the 1930 and 1931 losses are deducted. If these estimates are even approximately correct, we may consider that about 65% of the total stand on this half-section has been killed by insects since 1921. Other parts of the fringe type, of which the plot is a part, have suffered from heavier losses in the past, and the effects of these depredations have been terrific, as is shown by Fig. 1 (Photo 7446), a series of photographs taken from one point in the stand.

The 1931 infestation in this area is distinctly of an epidemic type. Groups of insect-infested trees were common as a result of 1931 summer-brood attacks, and many relatively young and thrifty trees succumbed this season.

Timber Mountain Unit

This small area has been severely affected by insect depredations and fires in past years. The basis for the estimate given in Table 2 is a cruise of a 40-acre plot located in the best timber on the unit and general observations. As in the fringe type of the Glass Mountain Unit, the infestation, as far as the quantity of timber killed is concerned, is and has been for several years epidemic, or nearly so. The infestation of 1930 was apparently due more to unfavorable conditions than to the vigor of insect attack. That of 1931, however, exhibited tendencies that would lead one to classify it as epidemic both in quantity and quality.

Badger Unit

Both of the 1931 cruises sampled the infestation in this large unit, and the results indicate a distinct increase and tendencies that, in the light of past experience, may be considered unmistakable evidence of the beginning of epidemic conditions. Although the infestation on the five plots cruised in this unit showed an average increase of 114% when compared with 1930 infestations on the same plots, it is not considered that epidemic conditions exist as yet. The sudden increase, however, coupled with the fact that groups of insect-infested trees (Fig.2--Photo 7447) have appeared throughout the area, is taken to indicate that conditions are unstable, and that unless action is taken it is very likely that another cycle of epidemic conditions will occur.

Heavier centers of infestation exist in this unit in the southwestern portion of T 44 N, R 8 E and in the northern portions of T 43 N, R 8 E. Control work has been recommended for this area and for a small center of infestation in T 43 N, R 7 E. Both of these areas are shown on the accompanying map. Estimates of average 1931 losses per section in these areas, based on data secured by cruises of plots, are approximately 160 trees per section, having a volume of about 130,000 ft.b.m.

Lava Bed Unit

An infestation of importance was found in this unit in T 41 N, R 4 E, within the Shasta National Forest. Here groups containing as many as 16 infested trees were found during the summer cruise. The infestation throughout the remainder of the unit is not considered to be particularly heavy as far as the amount of timber killed in 1931 is concerned. In view of the marked increase that occurred in the infestation in this area, however, it is felt that in this unit, as well as in the Happy Camp, White Horse and Badger Units, the increase may indicate the beginning of an epidemic.

A heavy windfall occurred on the Lava Bed in April 1931. It is not known how this affected the infestation in the area, but it is known that all the windfalls examined showed heavy broods of the western pine beetle and the Oregon engraver beetle--a fact that may play a part of some importance in 1931 winter-brood and 1932 infestations. Losses within the limits of the lava bed were on the whole not particularly heavy, but it was noted that the timber along the margins suffered from heavier, though not epidemic, infestations.

Happy Camp Unit

The infestation in this unit remains in the endemic stage, although scattered small groups of infested trees killed by 1931 broods of western pine beetle are present, and slight increases in the infestation were noted.

Pit River Unit

No plot was cruised in this unit, but an ample amount of observation and several road strips provide a basis for estimates and comparison with the other units of the area. The changes in this unit have not been as noticeable as in others, and the infestation remains an endemic type. In the fringe of timber in this unit losses are conspicuous and heavier than in the better types, but in no case were conditions considered serious.

White Horse Unit

The infestation in the better type of timber in this unit was found to be much heavier than would ordinarily be expected. The great increase of losses, such as that recorded for the check area, which is typical of the better-quality timber in the unit, is unexplained by any evident cause. Groups of young, thrifty trees were killed by the western pine beetle during the 1931 season; and in order to protect the operations and holdings of the McCloud Lumber Company, as well as to protect government holdings, it was considered that control work was necessary in the northern portion of the unit, in Townships 40 and 41 N, Ranges 4 and 5 E. This control area would connect and be worked in conjunction with the area within the Lava Bed Unit, for which control was recommended.

Another type of infestation, very similar to that which has ravaged the stands in the central Sierra region during the past season, was found in the poor-quality but relatively young and thrifty stands of timber growing on the lava beds and on the southern exposure of the Big Valley Mountains in the vicinity of Wiley Ranch. Here relatively large groups of trees were found to be infested, losses were heavy, and sorrel and red-topped trees formed a conspicuous part of the landscape. It is felt that a large portion of this infestation was due to unfavorable conditions for tree growth, in conjunction with unusually favorable conditions for bark beetle activity.

Recommendations for Control Work

Control work, to be completed by June 1923, has been recommended for portions of the Badger and White Horse Units. Memoranda concerning these recommendations have already been prepared, submitted to interested parties and adopted for action. In the Badger project the work is now under way.

The Badger control project is to be done under a cooperative agreement between the Pickering Lumber Company and the U.S. Forest Service. Approximately 39,000 acres are included in the control area, and the estimated cost of the work is $10,200. The object of the Badger control project is to prevent the building up of an epidemic infestation in the government and privately-owned timber lands involved in the Badger Sale Unit, and to preserve as much timber as possible for cutting.

The White Horse control project includes about 7,000 acres of government-owned land, on which control work is to be done by the McCloud Lumber Company in conjunction with their own protection work. The work is to be done under a cooperative agreement, and its object is to help retain the values of government timber from what is apparently the beginning of epidemic conditions, and to round out the McCloud insect control work so that centers of infestation will be removed from within the logical boundaries of their insect control unit.

TABLE 1
Insect Losses - Cruised Plots
Modoc National Forest

Plot	Acreage	Stand MBM	1930 Losses			1931 Losses				% Inc.
						Cruised		Estimated		
			Trs	Vol.B.M.	% Stand	Trs	Vol.B.M.	Trs	Vol.B.M.	% Stand	
R.S.4-Glass Mt.											
N½ 36, T 44 N,R 5 E:	320	1,148.0[1]	210	91,430	7.96	124	37,190	310	92,970	8.80	10.5
R.S.6-Lava Beds											
N½ 19, T 41 N,R 5 E:	320	1,814.3[2]	14	7,110	0.39	22	12,020	44	24,040	1.33[5]	241.0
Hog Lake-Badger											
W½ 10, T 43 N,R 8 E:	320	3,840.0[4]	33	31,060	0.81	37	31,990	53	45,700	1.19	46.9
Brown's Well-Badger											
N½ 35, T 44 N,R 8 E:	320	2,753.3[3]	19	20,590	0.75	48	44,010	69	62,910	2.29	205.3
Badger Reserve-Badger:											
S½ 13, T 44 N,R 8 E:	320	3,129.1[3]	37	25,640	0.82	42	30,640	60	43,800	1.40	70.8
R.S.5-Badger											
W½ 16, T 44 N,R 8 E:	320	3,121.0[3]	22	21,320	0.68	82	41,640	117	59,500	1.91	180.8
R.S.1-Badger											
S½ 22, T 43 N,R 7 E:	320	3,398.8[2]	44	49,110	1.44	52	57,130	74	81,600	2.40	66.6
R.S.2-Happy Camp											
W½ 28, T 42 N,R 7 E:	320	4,305.9[2]	30	43,220	1.00	11	15,290	37	50,970	1.18	18.0
R.S.3-Happy Camp											
W½ 18, T 41 N,R 6 E:	320	3,057.4[2]	17	15,730	0.51	9	5,320	30	17,730	0.58	13.7
Egg Lake-White Horse											
E½ 12, T 40 N,R 5 E:	320	6,796.0[4]	25	32,240	0.47	66	74,060	94	105,800	1.56	231.9

[1]F.S. Cruise, 1930
[2]U.S.B.E. Cruise, 1931
[3]F.S. Cruise, 1914, corrected for known insect losses
[4]From Person's 1930 report; corrected for losses
[5]Infested windfalls; included in 1931 losses

TABLE 2

Estimated 1931 Insect Losses - Happy Camp-Lava Beds

Unit	Acres	Vol.MBM	Estimated 1931 Losses			
			No. Trees	Vol. MBM	Av.Vol.per Tr.	% Stand
Glass Mountain	68,860	1,139,500	38,000	22,800	600	2.00
Timber "	1,600	10,790	420	210	500	1.95
Badger	67,760	811,100	13,330	12,800	960	1.58
Happy Camp	68,660	1,284,870	8,920	11,200	1,255	0.87
Lava Beds	73,200	625,860	11,710	8,200	700	1.31[1]
Pit River	35,200	28,200	3,120	2,340	750	0.83
White Horse	60,800	1,273,600	14,380	16,180	1,125	1.27
Totals	376,080	5,173,920	89,880	73,730		1.43

[1]Infested windfalls included as 1931 losses

Fig. 1

Series of photographs taken from one point within the Glass Mountain check plot ($N\frac{1}{2}$ Sec. 36, T 44 N, R 5 E)

(See opposite page et seq.)

The photos are views of the stand in eight directions from near the center of the plot. The few green trees remaining tend to hide the true extent of the damage that has been caused by insects during the past eleven years. The large number of snags and newly-killed trees--the foliage of which appears light in the pictures, due to the use of panchromatic film and an A filter--is impressive evidence of the present extent of the injury.

Looking North

Looking Northwest

Looking West

Looking Southwest

Looking South

Looking Southeast

Looking East

Looking Northeast

Fig. 2

Typical group of trees killed by 1931 summer broods of D.brevicomis in the Badger Unit. Six trees in this group are infested.

Fig. 3

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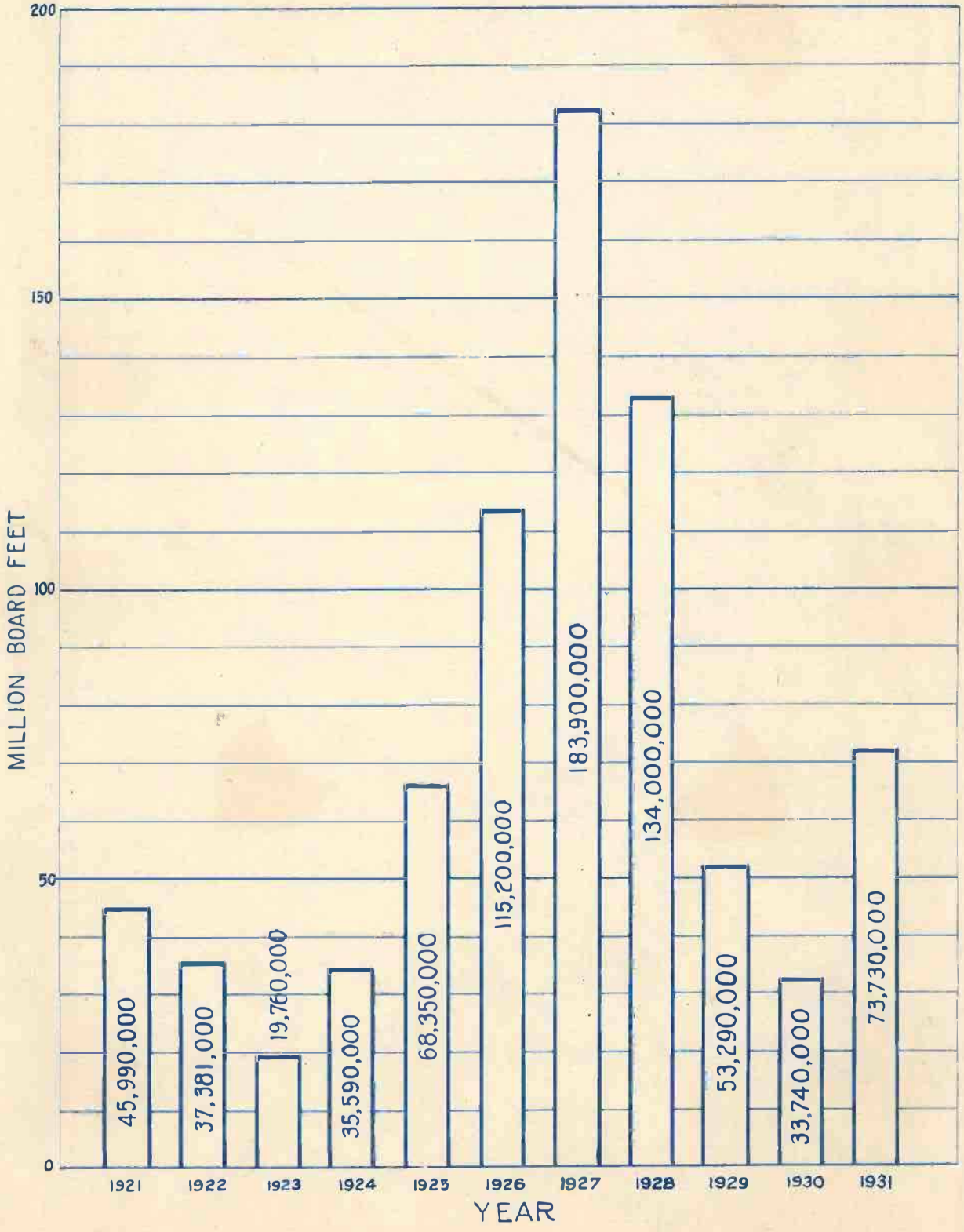
SUMMARY OF INSECT LOSSES

HAPPY CAMP - LAVA BED AREA

MODOC NATIONAL FOREST



LEGEND

Infestation Intensity:

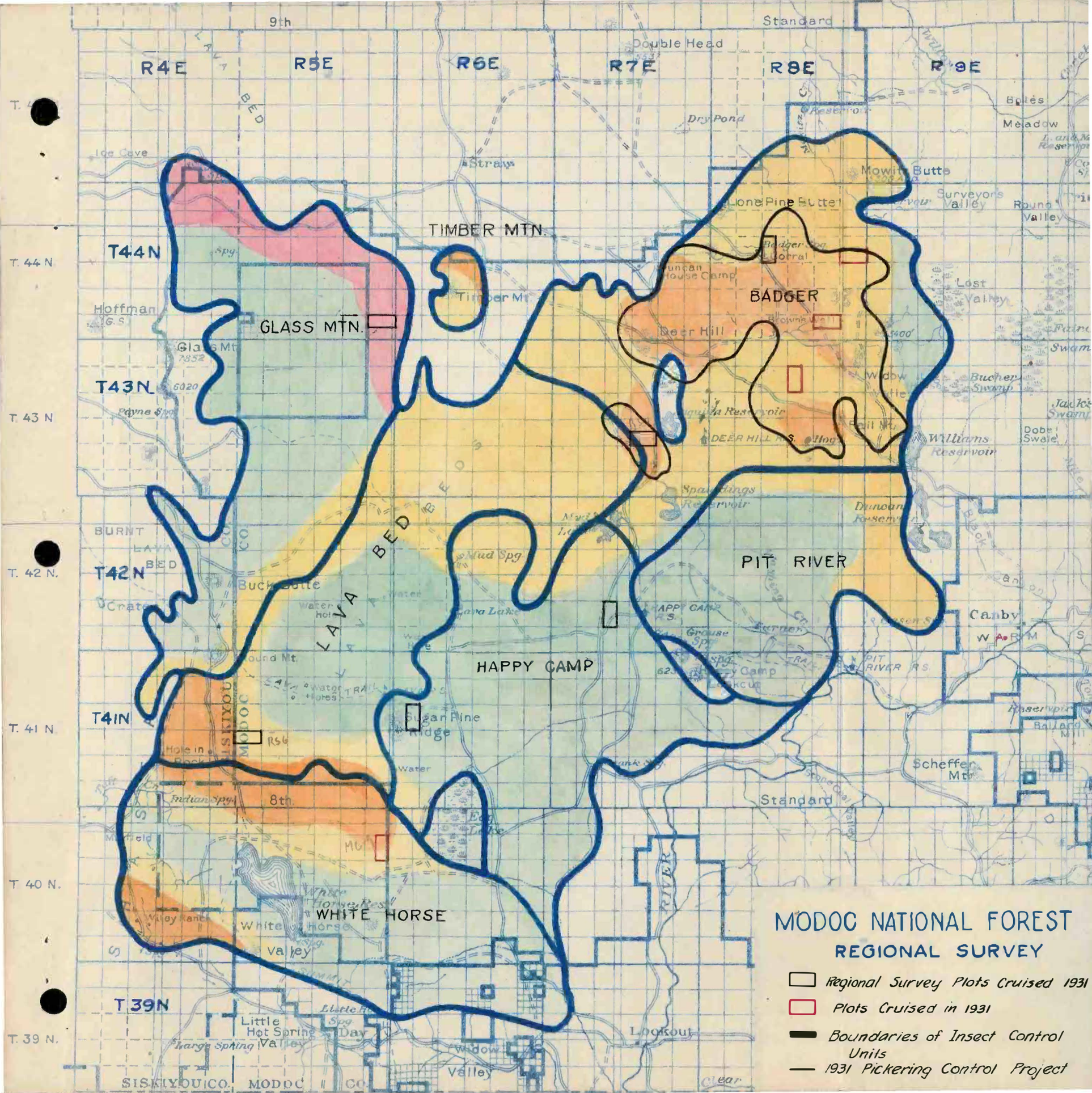
Less than 1% - - - - -

1 to 2% - - - - - - -

2 to 5% - - - - - - -

Over 5% - - - - - - -

Figure 4


R4E
R5E
R6E
R7E
R8E
R9E
T44N
T43N
T42N
T41N
T40 N.
T39N
T. 44 N
T. 43 N
T. 42 N.
T. 41 N
T. 40 N.
T. 39 N.
TIMBER MTN.
GLASS MTN.
BADGER
PIT RIVER
HAPPY CAMP
WHITE HORSE
LAVA BED
Double Head
Standard
Dry Pond
Mowitz Butte
Lone Pine Butte
Surveyors Valley
Round Valley
Bogus Meadow
Ice Cave
Straws
Hoffman
Glass Mt
Deer Hill
Lost Valley
Buchers Swamp
Dobe Swale
Williams Reservoir
Spaulding Reservoir
Duncan Reservoir
Mud Spg
Lava Lake
Grouse Spg
Sugar Pine Ridge
Hole in Rock
Indian Spg
Water
Canby
Scheffer Mt
Ballard Mtn
Lookout
Valley
Little Hot Spring Valley
Large Spring
Day
Siskiyou Co.
Modoc Co.
MODOC NATIONAL FOREST
REGIONAL SURVEY
Regional Survey Plots Cruised 1931
Plots Cruised in 1931
Boundaries of Insect Control Units
1931 Pickering Control Project